Department of Agriculture, Trade and Consumer Protection
Division of Agricultural Development
Agricultural Development & Diversification Program (ADD)
Grant Project Final Report

Contract Number: 21023

Grant Project Title: Feasibility of Large Scale Organic Processing Vegetables

Amount of Funding Awarded: $27,500

Name of Principal Contact Person: Jed Colquhoun and A.J. Bussan

Organization: University of Wisconsin Department of Horticulture

Email Address: colquhoun@wisc.edu

WEB Address: www.horticulture.wisc.edu

Report Submitted on: 12/15/07

---

1) What was the original intent of the grant?
   - What did you want to accomplish with the grant?
   - How was it expected to benefit Wisconsin Agriculture?
   - What makes this project work important or significant?

The goal of this grant was to determine the feasibility of large scale organic snap bean and sweet corn production for processing in Wisconsin. Studies addressed the primary hurdles in expanding organic vegetable production systems from the small to large scale. Specific objectives were to: 1) Evaluate input costs, crop yield, and quality in response to weed management strategies that would be practical in large-scale organic snap bean and sweet corn production systems; and, 2) Evaluate sweet corn yield and quality in response to organic fertility management systems and relative effect of different management strategies on input costs.

Several vegetable processing companies have expressed an interest in large-scale organic production in the upper Midwest. The development of a large organic vegetable production and processing industry in Wisconsin represents an unparalleled opportunity in an otherwise economically challenged sector. The development of this opportunity would have broad and significant ramifications at the local grower level by returning a profit margin to the processing vegetable industry. Correspondingly, organically produced and marketed vegetable products will stimulate an end-product processing industry with increased value relative to current markets. Given the multi-national interests of the companies involved, it would be Wisconsin's loss and another production region's gain not to garner this rapidly developing business sector. This report summarizes the first year of a 2-year project funded by the DATCP-ADD program and the Midwest Food Processors Association (MWFPA).

2) What steps did you take to reach your goal?
   - What worked?
   - What challenges did you face?
   - What would you do differently?

Field research was conducted to address the above goals. The weed management research was conducted in snap beans and sweet corn and evaluated practical management strategies that could be readily adopted by growers. Organic weed management treatments consisted of either a single management tactic or combinations of tactics including different methods and number of cultivations and utilization of a stale seedbed. An herbicide-based conventional treatment was also included for comparison. Studies were arranged in a randomized complete block design with each treatment replicated four times. Data collection included weed density and biomass, visual evaluations of weed control and crop yield and quality. Input costs were calculated and correlated with crop yield and quality.

The organic fertility management research was conducted in sweet corn. The general approach was to evaluate corn response to different fertility treatments (combinations of cover crops, composted poultry manure, and organically approved fertilizers) in the first year. In the second year, the experiment was cropped to snap bean to determine the residual effect of the sweet corn fertility treatments. Data collection included crop response to fertility treatments (such as emergence, stand density, and tillering), ear leaf tissue analysis, soil fertility analysis at several times during the experimental period, and sweet corn yield. Snap bean yield was quantified in the second year.

The studies were completed without any major hitches, although the 2007 growing season was very warm and droughty. This challenge of differences among production years will be overcome by repeating the experiments in the 2008 growing season. Yearly variation is typical of agricultural research.

3) What were you able to accomplish?
   - What are the results from this project?
   - Include any analysis of data collected or materials developed through project work.

In snap bean, weed biomass in the crop row was similar to the conventional program where row-crop cultivation (one or three cultivations) was used with or without pre-emergence rotary hoeing or stale seedbed. Between-row weed control in the organic programs was greatest when snap beans were cultivated two or three times. Snap bean yield and crop value (production value minus weed control cost) were similar to the conventional weed management program where two or three row-crop cultivations were used or where pre-emergence rotary hoeing was followed by one row-crop cultivation. Organic weed management in sweet corn was more challenging in part because of the lack of early-season crop competitiveness with weeds and the longer crop season relative to snap bean. Sweet corn yield and crop value were similar to the conventional weed management program only where three row-crop cultivations were used or where two row-crop cultivations were followed by hand-weeding.

In the fertility study, sweet corn yield had a typical rate response to nitrogen irrespective of fertilizer source with the exception of the 1x manure rate which yielded 15 to 20% less than other 1x rates. Estimated N rates

from green manures appeared to be accurate as yields fertilized according to 60 and 100 lb rate for pea and alfalfa yielded similar to other 1x rates. OMRI approved fertilizers applied at 1x rates resulted in yields similar to yields with ammonium nitrate. Price was $500/a for OMRI approved fertilizers compared to $75/a for conventional fertilizers. Fertilizing with 1x N rates with manure led to application of P at close to 200 lb/a, which far exceeds current restrictions on manure application under 590 rules. P based applications of manure restricted application rates to comply with 590 rules led to insufficient N for sweet corn unless supplemented with green manures and/or OMRI approved fertilizers. Use of pea green manures and composted manure dramatically reduced cost of purchasing OMRI approved fertilizers, but costs of manure transport and application also need to be considered.

Results of this project have been communicated widely with growers, food processors, and end-users/buyers. Unique relationships have been developed to allow for a very rapid adoption and positioning of Wisconsin as a primary source for large-scale organic vegetables. Several grower meetings, field days and tours, processing company tours and meetings, and individual training sessions have been held. This research was presented at the Food Research Institute Organic Foods Symposium that included an international audience of Fortune-500 company management and at several regional and national professional meetings. Additionally, the preliminary results of this study have been used in other grant proposals as a "seed" project, and recently assisted in securing almost $500,000 in USDA-NRI funds to further develop this work and assist Wisconsin agricultural production. This grant likely would not have been funded without first demonstrating the utility and feasibility of such work using the DATCP-ADD funded work, thus the results are recognized and valued by peers.

4) What conclusions can you make based on project work the analysis of collected data?

The shorter season processing crops, such as peas and snap beans, can be practically and economically produced using organic weed management and fertility options. Snap beans are a short-season (60 day) crop that emerge rapidly from the soil, establish a rapid canopy that out-competes weeds, and are harvested prior to weed seed production. Fertility requirements are rather low and can be met by plowing down cover crops or alfalfa. Conversely, sweet corn emerges slowly from the soil, grows slowly and barely ever forms a competitive crop canopy, is poorly competitive with weeds, and has a relatively high nitrogen requirement. Therefore, sweet corn yield reductions can be expected when comparing organic with conventional sweet corn, and production costs will be greater because of the increased fertility costs. Organic sweet corn buyers will need to account for the yield reduction and production costs when approaching organic processing crop growers.

5) What do you plan to do in the future as a result of this project?

We will continue with year 2 of this project. Additionally, results will continue to be communicated with growers and end-users, with several presentations scheduled for this winter. We will also initiate the USDA-NRI funded research described above, as well as other funded proposals, that will further refine this production system.

6) What information or additional resources are needed to commercially develop this enterprise?

This project has provided an excellent opportunity to stimulate and develop relationships between organic crop buyers and potential producers, but this opportunity could be further exploited if a more structured communication network was implemented. More specifically, Wisconsin would benefit greatly by developing a public database of organic producers, their location, crops produced and specific specialties, and packaging and processing capabilities within the state. This resource could be utilized as a "match-maker" to unite potential growers with the buyers and end-users that have observed very high demand for organic vegetable products. We have discussed this opportunity with the Organic Advisory Council.

7) How should the agricultural industry use the results from your grant project?

The results of this research will be directly implemented in the organic vegetable production system and used to make cropping decisions by the vegetable processing companies. The results have been very useful in improving the efficiency of the production system, thus increasing the margins for growers while reducing the production risks for the food processors. Additionally, these results provide valuable and realistic information for determining the value and production costs for processors and growers, respectively.